

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in Locks and Latches for Doors and the like

We, DAIMLER-BENZ AKTIENGESellschaft, of Stuttgart-Untertürkheim, Germany, a Company organised under the Laws of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to lock or latch devices for doors, covers and the like and more particularly for motor vehicle doors. The invention is concerned with lock arrangements of the kind comprising a mechanically, pneumatically or electromagnetically actuated pivotal control member and a hydraulically actuated pivotal bolt member.

In latches of this type, an auxiliary force is tripped by a slight expenditure of force, e.g. finger pressure—whereby the locking or unlocking—e.g. of omnibus doors—occurs. It is an object of the invention to provide a simple, inexpensive and reliable latch and lock unit, whereby tight closing of the door and locking thereof are effected hydraulically. By this means, a motor vehicle door may be closed and opened silently with quite a low expenditure of force, but nevertheless the actual locking is ensured either by the exercise of hydraulic force or by mechanical detent means.

According to the invention, a door or like latching or locking means comprising a mechanically, pneumatically or electro-magnetically actuated pivotal control member and a hydraulically actuated pivotally mounted bolt member, is characterised by a hydraulic servomotor and a spring being articulated to the bolt member in such a manner that, when the control member is operated the spring forces the bolt member into the position of unlatching the door and also forces the hydraulic servomotor into a dead centre position with respect to the pivot point of the bolt member, the hydraulic servomotor being caused to leave its dead centre position by impact of

the bolt member against the striking plate device, when the door is closed, to compel the bolt member to overcome the force of the spring and to move into the position of tightly closing and latching the door, additional means being provided to enable tight closing and latching of the door to be effected in a case of failure of the hydraulic system.

Even in the case of a slight impact by the bolt member, which is mounted on the door, against the plate or catch device which is secured to the car body, the hydraulic auxiliary force applied by the servomotor, compels the door to become tightly closed and locked. This is advantageous, especially in the case of passenger motor vehicles, since a passenger seated in the vehicle and desiring the door to be closed and locked, has only to pull the door very slightly towards him in order to obtain the desired result. Slamming of the door, which is disadvantageous alike for the door hinges, for the door and for the car body, is eliminated.

As the said additional means which is active in the event of failure of the hydraulic system, a detent pawl may be disposed between the bolt member and the control member which pawl is adapted for engaging a notched step of the bolt member for latching or locking the door and is disengageable from the said notched step by actuation of the control member.

The invention will now be described in detail with reference to the accompanying drawings which illustrate by way of example, two embodiments as applied to a motor vehicle door, in which drawings:—

Figure 1 shows a latch and lock unit as seen in a cross-section of a portion of a vehicle door;

Figure 2 is a side elevation of the latch and lock unit seen in Figure 1;

Figure 3 is similar to Figure 1 but illustrates a modification of the latch and lock unit;

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Figure 4 is a side elevation of parts of the unit seen in Figure 3, and

Figure 5 is a plan view of a portion of the unit seen in Figure 3 and of the parts seen in Figure 4.

The latch and lock unit 1 in Figures 1 and 2, is secured by screws 2 in a side panel of the door 3. The unit can be operated from outside by a press-button 4 fitted in the door handle 34 or from the inside by a spring-loaded angle lever 30 which operates a bolt member 5 in a manner to be shown. The side wall 7 of the vehicle against which the door is closed, has a striking plate or notched catch 8 secured to it, the latter being adapted for engagement by the bolt member 5 as hereinafter described. The inner side wall of the door is indicated by the numeral 6.

In Figure 1, the door 3 is shown in a closed position into which it has been moved gently against the vehicle body and so that the bolt member 5 just comes into engagement with the catch 8. Thus the door is not yet latched and in this condition the bolt member 5 is made to bear against an adjustable screw stop 10 by a spring 9 engaged with a lug 51 on an arm of the bolt member 5. The latter is a three-armed lever pivotally mounted on a pin 11 secured on a base plate 18. The piston 12 of a servo-motor 13 is pivotally connected at 14 to the bolt member 5 and works in the cylinder 15 of the servomotor 13. The cylinder 15 is rockably mounted on a pivot 16 carried by a bracket 17 on the base plate 18. By adjustment of the screw stop 10, the bolt member 5 can be arrested in such a position that the longitudinal axis of the servomotor 13 passes through the pivot 11 of the bolt member so that when hydraulic pressure is admitted behind the piston with the parts in the position shown, the piston 12 is on a dead centre and cannot actuate the bolt member 5. A pipe 19 has one end connected at 20 to the cylinder 15 and has its opposite end connected to a change-over valve 21 secured on the base plate 18. The valve 21 is adapted for connecting the pipe 19 alternatively to a pressure pipe 22 and to an exhaust pipe 23 and it is operated mechanically by a rocking lever 24 pivoted at 25, one arm of this lever being operative for pressing in a valve stem 53 and the other being operative for pressing in a valve stem 55. In Figure 1, the valve stem 53 is shown depressed for putting the piston 12 to pressure. The pivot 25 of the lever 24 is mounted on the casing of the change-over valve 21 and one arm of the lever 24 has a pin-and-slot engagement 26 with an arm 46 of a control member 27. The latter is a three-armed lever mounted on a pivot 28 on the base plate 18, one arm 50 of this lever being engaged by a spring 29 which constantly tends to force the arm 50 against a projection on an angle lever 30 as seen clearly in Figure

1. The angle lever 30 is mounted on a pivot 33 secured as seen in Figures 1 and 2, in a side flange of the base plate 18 and is under the influence of a spring 41 coiled around the pivot 33 and constantly tending to turn the lever 30 so that one of the arms is arrested by a wall 44 of a housing attached to the base plate 18, which housing is entered by the projecting notched catch of the plate 8 when the door is closed as seen in Figure 1. The spring 29 has one end articulated to the control member 27 and its other end articulated at 54 to a bracket 32 bolted to the base plate 18. The press-button 4 acts upon the third arm 42 of the control member 27. A detent pawl 35, mounted on a pivot 36 on the base plate, is arranged between the control member 27 and the bolt member 5 and is influenced by a spring 37 which constantly tends to keep the tooth of the pawl against the bolt member 5. The bolt member 5 is provided with a notched step 38 for engagement by the detent pawl 35 in circumstances to be explained. A stud 40 is secured to the control member 27 and is so disposed that when the control member 27 pivots counter-clockwise the engagement of the stud 40 with the tail of the pawl 35 causes the latter also to be pivoted counter-clockwise so that its tooth 49 is out of range of engagement with the notched step 38.

The operation of this latch and lock unit is as follows:—

To open the door when in its fully latched position, the press-button 4 on the outer door handle is actuated, or the angle lever 30 at the inner door handle is actuated and the change-over valve 21 is operated by the lever 24 to put the servomotor to exhaust as hereinafter described. Upon releasing the press button 4 or the angle lever 30, the control member 27 is returned to the position seen in Figure 1 in which the lever 24 is rocked to depress the stem 53 and thereby re-admit pressure to the servomotor 13 but the latter remains inactive because it occupies the aforesaid dead centre position. When the door is subsequently closed, the bolt member 5 strikes the plate 8 and is moved further than is shown in Figure 1 and so that its nose 47 slides upwards slightly along the track 43 of the notch 48. In this way the bolt member 5 is rotated clockwise against the resistance of the spring 9 and as a result the servomotor 13 is rocked so that its axis no longer passes through the centre of the pivot 11. The piston 12 of the servomotor 13, impinged upon by the pressure fluid, now rotates the bolt member 5 clockwise and the nose 47 is forced up the track 43 into the notch 43 and thereby tightly closes and locks the door. In order to do this, it is sufficient for the door to be applied quite gently to the vehicle body. The door is retained in the locked state by the piston 12 which is under pressure. If

it is desired to open the door, either from outside or from the interior of the vehicle, the press-button 4 is depressed, or the angled lever 30 is rotated clockwise via a linkage—

5 not shown—pivotally connected with the lever 30 at 45. The control member 27 is thereby pivoted counter-clockwise against the action of the spring 29 and with its arm 46 operates the change-over valve 21 via the lever 24 in

10 such a manner that the piston 12 is put to exhaust by way of the pipe 19, the valve 21 and the exhaust pipe 23. The spring 9 returns the bolt member 5 into the position shown and the door is unlatched and ready

15 for opening. Should the servomotor 13 fail for any reason then closure of the door 3 can be effected by slamming the door 3 shut whereupon the nose 47 of the bolt member 5 slides upon the track 43 of the plate 8 into the notch 48. In this position, the bolt member 5 is retained by the detent pawl 35. Upon pivoting of the bolt member 5, the detent pawl 35 slides along the member 5 and finally engages the notched step 38. Upon

20 opening of the door—i.e. upon pressing in the press-button 4 or turning the angled lever 30—the detent pawl 35 is pivoted counter-clockwise out of the notched step 38 by the stud 40 secured to the control member 27, and the spring 9 is able to restore the bolt member 5 into the position shown, which unlatches the door. The notched step 38 is so

25 arranged on the bolt member 5 that in the case of hydraulic locking of the door 3 the tooth 49 of the detent pawl 35 does not engage the notched step 38, so that upon opening of the door the detent pawl 35 has to be turned only against the slight force of the spring 37. In order to prevent the occurrence of a snapping noise when the detent

30 pawl 35 engages the notched step 38 upon closure of the door, the stud 40 may be covered with elastic material to prevent the detent pawl 35 from striking against the bottom of the notched step 38. The latch and lock unit may be secured against unauthorized operation, after the door has been closed from the outside, by anyone of the known

35 lock devices associated with the press button 4, and which require a key to be inserted and turned in the press button before the latter can be operated to actuate the control member 27. The latch and lock unit may also be secured against the said unauthorized operation by the insertion of lockable means in the pipe 19 or in the valve 21, or in the exhaust pipe 23 said means being adapted for preventing the servomotor from being put

40 to exhaust. By such means, it can be made impossible for the servomotor 13 to be put to exhaust even if the control member 27 is operated.

45 In the modification in Figures 3 to 5 the components are provided with the same reference numerals as the corresponding components in Figure 1 and Figure 2. Moreover, in Figures 3 to 5 the latch and lock unit is illustrated with the parts in the positions reached when a motor vehicle door has been fully latched and tightly closed. The lever 24 which operates the change-over valve 21 is in the modification firmly connected to the control member 27, so that the lever 24 and the control member are mounted in common upon the pivot 25 mounted on the casing of the valve 21. The bolt member 5 and the catch device of the plate 8 co-operate as in Figure 1, but in this case the notch 48 is formed in the bolt member 5 and the nose 47 engaging in the notch 48 is a part of the said catch. The spring 9 and the servomotor 13 are articulated to the bolt member 5 at the same point 14. A conical stud 52 secured within the walls 44 of the housing serves in known manner to guide the door 3 in its closing movement into the door aperture of the vehicle body, and gives the door a support against the vehicle body in the longitudinal direction of the vehicle. The stud 40 covered with elastic material is in this case carried by the detent pawl 35 instead of by the control member 27. The bracket 32 is adjustable in the transverse direction, so that the position of the point of articulation 54 of the spring 29 with respect to the point of articulation 25 of the control member 27 is variable. The point of articulation 54 is so disposed that in the position shown—i.e., when the control member 27 is not actuated—the point of articulation 31 is located to the right hand of a line joining the points of articulation 54 and 25, so that whenever the press-button 4 or the angled lever 30 is not actuated the control member 27 occupies the position shown in which the lever 24 presses in the valve stem 53 for putting the piston of the servomotor to pressure. If the control member 27 is actuated—i.e., rotated clockwise—the lever 24 secured to the control member 27 presses in the valve stem 55 instead of the valve stem 53, while the points of articulation 25, 31 and 54 do not yet lie in a straight line (a dead centre position for the force of the spring 29). If the control member 27 is rotated still further, the point of articulation 31 first enters the line joining the points of articulation 25 and 54, and then lies on the left-hand side of the said line. The force of the spring 29 now acts additionally to the force of actuation and against the resistance of the valve stem 55 of the change-over valve 21. By this means, actuation of the latch and lock unit is effected with slight expenditure of force. When the control member 27 is no longer actuated, it is rotated counter-clockwise by the resistance of the valve stem 55, namely beyond the dead centre position for the force of the spring, i.e., until the point of articulation 31 once more lies to the right of

the line joining the points of articulation 25 and 54. The further pivoting of the control member 27 is then brought about by the force of the spring 29.

5 WHAT WE CLAIM IS:—

1. Door or like latching or locking means comprising a mechanically, pneumatically or electromagnetically actuated pivotal control member and a hydraulically actuated pivotally
10 mounted bolt member, characterised by the hydraulic servomotor and a spring being articulated to the bolt member in such a manner that, when the control member is operated, the spring forces the bolt member into the
15 position of unlatching the door and also forces the hydraulic servomotor into a dead centre position with respect to the pivot point of the bolt member, the hydraulic servomotor being caused to leave its dead centre position
20 by impact of the bolt member against the striking plate device, when the door is closed, to compel the bolt member to overcome the force of the spring and to move into the position of tightly closing and latching the door,
25 additional means being provided to enable tight closing and latching of the door to be effected in case of failure of the hydraulic system.

2. Door or like latching or locking means
30 according to Claim 1, wherein there is interposed between the bolt member and the control member an additional means in the form of a detent pawl which is able to engage a notched step of the bolt member and is
35 adapted for being disengaged from the said notched step by actuation of the control member when the door is to be opened.

3. Door or like latching or locking means according to Claim 2, wherein the control member is retained by a spring in a limit position in which the detent pawl is able to operate, and that in the said position the control member acts upon a hydraulic change-over valve which is adapted for putting the hydraulic servomotor alternately to pressure
40 and to exhaust. 45

4. Door or like latching or locking means according to Claim 3, wherein upon actuation of the control member against the force of the spring, the hydraulic change-over valve is brought into the position in which the hydraulic servomotor is put to exhaust. 50

5. A modification of the door or like latching or locking means according to Claim 1, wherein the hydraulic servomotor is put to pressure or to exhaust by a change-over valve under the influence of a snap-action dead centre spring in association with the control member, operation of the latter in the direction for unlatching causing the spring to move the change-over valve into a position for putting the servomotor to exhaust, and operation of said control member by the pressure of the valve itself causing the spring to move the change-over valve into a position for putting
60 the servomotor to pressure. 65

6. Door or like latching or locking means constructed and adapted for operation substantially as hereinbefore described with reference to Figures 1 and 2, or Figures 3 to 5, of the accompanying drawings. 70

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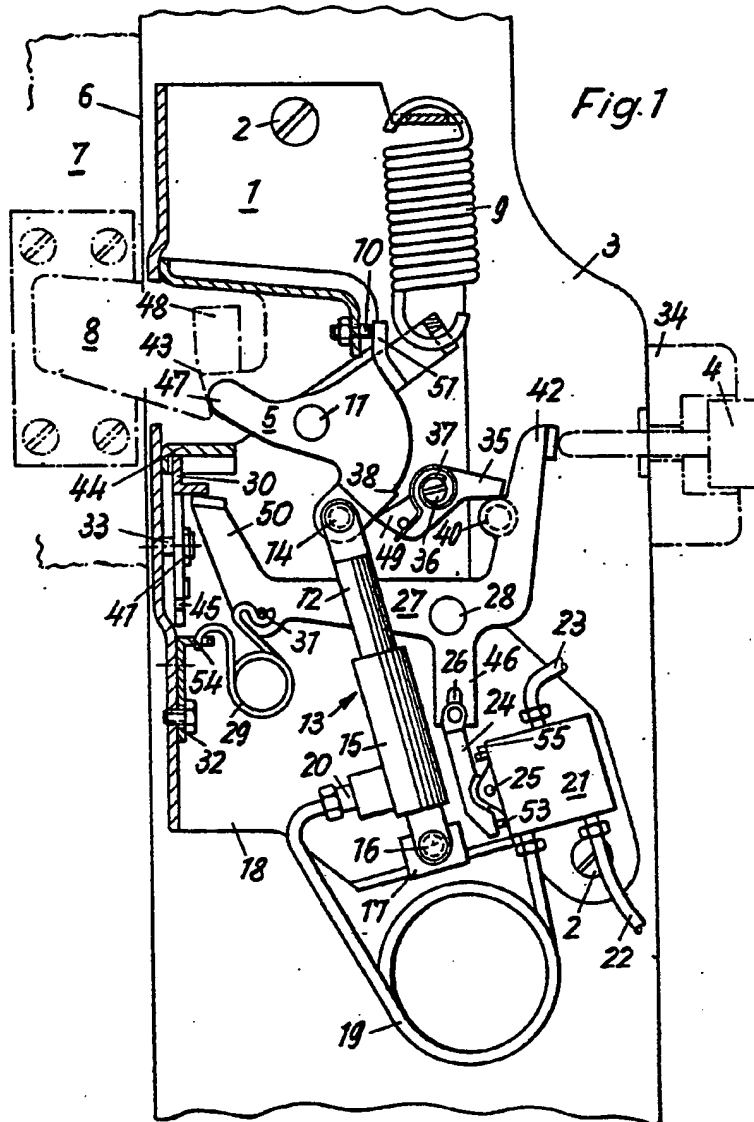
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3 SHEETS

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Sheet 1



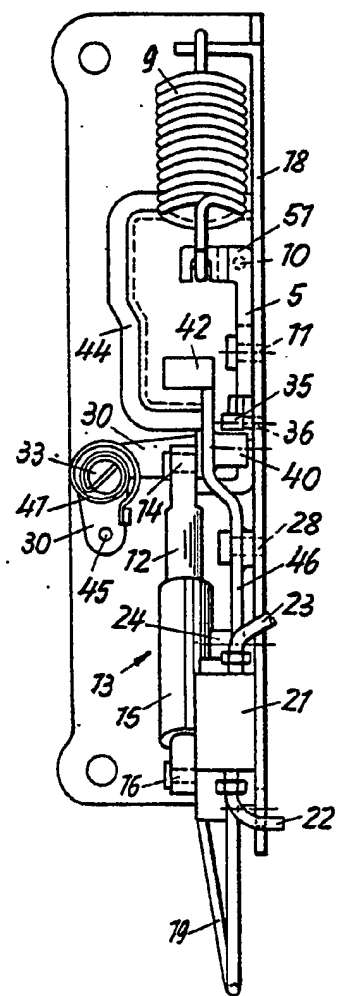


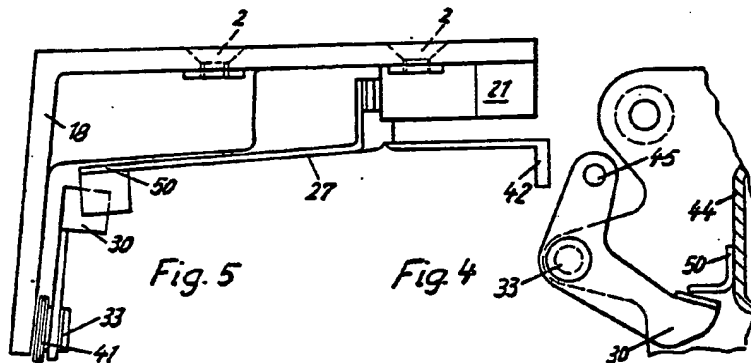
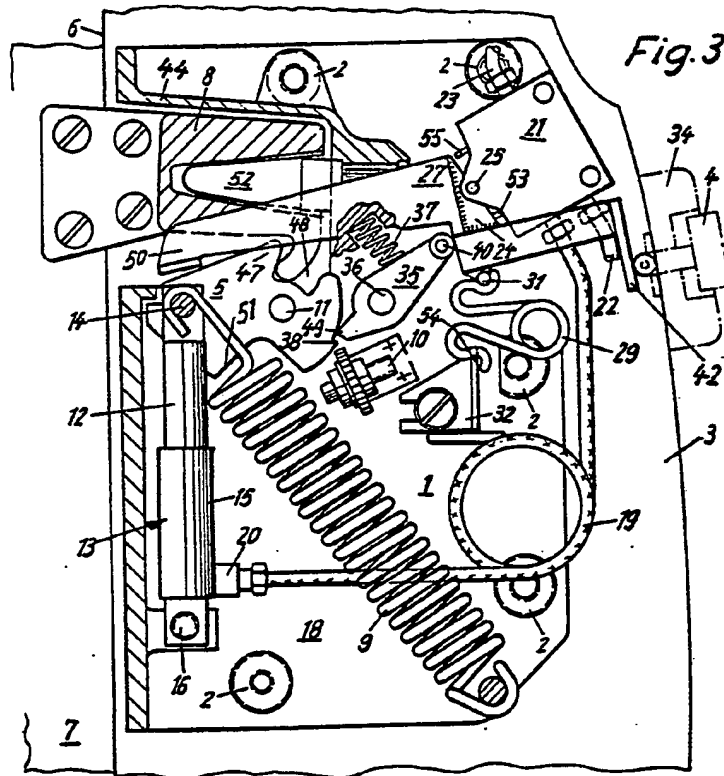
Fig. 2

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COMPLETE SPECIFICATION

3 SHEETS

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Sheets 2 & 3



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